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EXAMINER

CANTELMO, GREGG

ART UNIT PAPER NUMBER

1745

DATE MAILED: 11/28/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/772,228

Applicant(s)

VISCO ET AL.

Examiner

Gregg Cantelmo

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-43 is/are pending in the application.
- 4a) Of the above claim(s) 13 and 18-43 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 and 14-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 February 2004 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |  |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input checked="" type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. <u>11/13/06</u> |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>SEE OFFICE ACTION</u> | 6) <input type="checkbox"/> Other: ____  |

**DETAILED ACTION**

***Election/Restrictions***

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
  - I. Claims 1-17, drawn to an electrochemical device component having a two-layer separator, classified in class 429, subclass 247.
  - II. Claims 18-20, drawn to a 2-layer separator, classified in class 428, subclass 411.1+.
  - III. Claims 21-22, drawn to a method of making an electrode, classified in class 29, subclass 623.3.
  - IV. Claims 23-43, drawn to a battery, classified in class 429, subclass 231.95.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are related as subcombinations disclosed as usable together in a single combination. The subcombinations are distinct if they do not overlap in scope and are not obvious variants, and if it is shown that at least one subcombination is separately usable. In the instant case, subcombination the separator has separate utility such as a two-layer film in semiconductor devices, selective ion exchange membranes, etc. See MPEP § 806.05(d). Inventions I and III are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product can be made by other processes such as PVD, CVD, laser ablation, sintering, etc.

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Inventions I and IV are related as subcombinations disclosed as usable together in a single combination. The subcombinations are distinct if they do not overlap in scope and are not obvious variants, and if it is shown that at least one subcombination is separately usable. In the instant case, subcombination of the electrochemical element of Group I has separate utility such as a cathodic electrochemical element (whereas Group IV requires the electrochemical element to be the anode). Furthermore the electrochemical element of Group I can be used in other solid-state devices such as capacitors. See MPEP § 806.05(d).

3. Inventions II and III are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product can be made by other processes such as PVD, CVD, laser ablation, sintering, etc. and further the product can be made to preclude an active metal anode as required in the process. Inventions II and IV are related as subcombinations disclosed as usable together in a single combination. The subcombinations are distinct if they do not overlap in scope and are not obvious variants, and if it is shown that at least one subcombination is separately usable. In the instant case, the subcombination separator of Group II has separate utility such as a two-layer film in semiconductor devices, selective ion exchange membranes, etc.

4. Inventions III and IV are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the

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process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product can be made by other processes such as PVD, CVD, laser ablation, sintering, etc.

5. Because these inventions are independent or distinct for the reasons given above and have acquired a separate status in the art in view of their different classification, restriction for examination purposes as indicated is proper. Because these inventions are independent or distinct for the reasons given above and the inventions require a different field of search (see MPEP § 808.02), restriction for examination purposes as indicated is proper. Because these inventions are independent or distinct for the reasons given above and have acquired a separate status in the art because of their recognized divergent subject matter, restriction for examination purposes as indicated is proper.

6. This application contains claims directed to the following patentably distinct species:

UPON ELECTION OF GROUP I:

Applicant is required to elect an ultimate species for each of the active metal electrode, first and second material layers. The election must also list all claims readable on the elected species.

UPON ELECTION OF GROUP II:

Applicant is required to elect an ultimate species for each of first and second material layers. The election must also list all claims readable on the elected species.

UPON ELECTION OF GROUP III:

Applicant is required to elect an ultimate species for each of the active metal electrode, and first and second material layers. The election must also list all claims readable on the elected species.

UPON ELECTION OF GROUP IV:

Applicant is required to elect an ultimate species for each of the active metal electrode, first and second material layers and positive electrode. The election must also list all claims readable on the elected species.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which depend from or otherwise require all the limitations of an allowable generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species.

MPEP § 809.02(a).

7. During a telephone conversation with Mr. James Austin on November 13, 2006 a provisional election was made without traverse to prosecute the invention of Group I, claims 1-12 and 14-17. Applicant further elected the following species:

a) The composite reaction product of lithium metal with  $\text{Cu}_3\text{N}$  for the first material;

- b) The ion conductive glass ceramic of claim 14 for the second material;
- c) Lithium as the active material.

Affirmation of this election must be made by applicant in replying to this Office action. Claims 18-43 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention. Also claim 13 is withdrawn from consideration as to a non-elected species for the first material.

8. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

#### **EXAMINER'S AMENDMENT**

9. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. James Austin on September 21, 2006.

- a. In claim 9, at line 2, after "consisting of", insert -- a composite reaction product of active metal with  $\text{Cu}_3\text{N}$ ,--;
- b. In claim 10, at line 2 after "consisting of", insert -- a composite reaction product of Li with  $\text{Cu}_3\text{N}$ ,--.

***Priority***

10. This application repeats a substantial portion of prior Application Nos. 10/731,771, filed December 5, 2003 and 10/686,189, filed October 14, 2003, and adds and claims additional disclosure not presented in the prior application. Since this application names an inventor or inventors named in the prior applications, it may constitute a continuation-in-part of the prior application. Should applicant desire to obtain the benefit of the filing date of the prior application, attention is directed to 35 U.S.C. 120 and 37 CFR 1.78.

***Information Disclosure Statement***

11. The information disclosure statements filed February 27, 2004; October 1, 2004; January 31, 2005; November 21, 2005; March 16, 2006; May 26, 2006; June 8, 2006, July 31, 2006 and October 2, 2006 have been placed in the application file and the information referred to therein has been considered as to the merits. With respect to the information disclosure statement filed July 31, 2006, the citation of U.S. Patent Application Publication No. 2001/041294 A1 to Chu et al. is incorrect. It appears that this document should be U.S. Patent Application Publication No. 2001/0041294 A1 to Chu et al. and this prior art patent application publication has been cited on the enclosed Form PTO-892. With respect to EP 0111213A2, the corresponding reference provided, in the absence of a statement of relevance or English abstract, does not appear to be relevant and has not been considered.

***Drawings***



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12. The drawings received February 3, 2004 are acceptable for examination purposes.

***Specification***

13. The disclosure is objected to because of the following informalities: the specification references various U.S. Patent Applications (see page 25, for example) at least some have which have since matured into corresponding U.S. patents (such as U.S. Patent Application No. No. 10/189,908, now U.S. Patent No. 6,991,662). Applicant is required to update the status of each U.S. Patent Application to their respective U.S. Patent numbers throughout the disclosure. Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

14. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 3 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 3 recites that the ratio of the 1<sup>st</sup> and 2<sup>nd</sup> materials is defined by a range but does not indicate what parameter this ratio is a ratio of (e.g., thickness, density, volume, mass, etc.). Thus the particularly claimed ratio is indefinite. Furthermore the specification does not provide clearer definition of this term since it appears that the recitation of the ration of claim 3 is not recited within the remainder of the disclosure. Furthermore the specific limitation of the ratio is unclear. A ratio defined as less than 1-1000 is not a typical definition for a ratio. Ratios are generally presented as a single

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value, e.g. less than 1; or by a ratio between two values, e.g. 2:1. Ratios are not generally or commonly presented as a range and given the ambiguity of the claimed ratio, the invention of claim 3 cannot be clearly understood, and therefore is indefinite.

***Claim Rejections - 35 USC § 102***

15. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 5-12 and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,314,765 (Bates '765) as evidenced by the enclosed property listing sheet for Lithium Phosphorous Oxynitride ("Lipon") Electrolyte properties.

While a species election has been made by Applicant, since the particular species to the first material was not found in the prior art of record, this species has been deemed allowable. However as to the broader claimed invention, at least a remainder of the materials claimed are taught by the prior art of record, and in particular, anticipated by Bates.

Bates '765 discloses a lithium anode 42 having a composite protective layer 48 provided on the surface of the anode 42 (Fig. 1 and col. 3, ll. 4-5). The composite protective layer 48 includes a first layer 50 of lithium nitride and a second layer 52 of LiPON (col. 3, ll. 3-22). LiPON is known to have an ionic conductivity of  $10^{-6}$  S/cm at 25 °C as evidenced by the enclosed data sheet for LiPON (Fig. 2 as applied to claims 1

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and 2). Furthermore the combination layering of Bates '765 includes lithium nitride and LiPON. This combination of materials exemplifies one claimed embodiment. Claim 10 includes a first material of lithium nitride and claim 12 includes a second material of LiPON thus the prior art combination appears to have the same composite composition as that of the instant claims and is expected to exhibit the same ionic conductivity for the composite (as applied to claim 2).

As best that claim 3 can be understood, the ratio of the second material 48 is greater than that of the first material 50 (Fig. 2 and col. 3, ll. 10-14 and 19-21 as applied to claim 3).

LiPON is known to have an ionic conductivity of  $10^{-6}$  S/cm at 25 °C as evidenced by the enclosed data sheet for LiPON (Fig. 2 as applied to claims 5 and 6). Note that the term about is not defined by the claim and thus is inclusive of the inherent value of LiPON, being  $10^{-6}$  S/cm (as applied to claim 6).

As best that claim 7 can be understood, the ratio of the second material 48 is greater than that of the first material 50 (Fig. 2 and col. 3, ll. 10-14 and 19-21 as applied to claim 7).

The active material is lithium, as discussed above (applied to claim 8).

The first material is Li<sub>3</sub>N, as discussed above (applied to claims 9 and 10).

The second material is LiPON, as discussed above (applied to claims 11 and 12).

The first and second layers are discrete layers (Fig. 2 as applied to claim 16).

***Claim Rejections - 35 USC § 103***

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

16. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

17. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bates '765 in view of either U.S. Patent No. 5,569,520 (Bates '520) or U.S. Patent No. 6,025,094 (Visco).

The teachings of Bates '765 have been discussed above and are incorporated herein.

The difference between Bates '765 and claim 4 is that Bates does not teach of providing a current collector.

While Bates '765 does not expressly show or teach of current collectors, the presence of such would be a requirement of the device in order to effectively transfer electric current between the battery and a load.

Bates '520 teaches of the use of such current collectors 96 (Fig. 11) as does Visco who teaches that the negative electrode is spaced from the positive electrode, and both electrodes may be in material contact with an electrolyte separator. Current collectors contact both the positive and negative electrodes in a conventional manner and permit an electrical current to be drawn by an external circuit. In a typical cell, all of the components will be enclosed in an appropriate casing, plastic for example, with only the current collectors extending beyond the casing. Thereby, reactive elements, such as sodium or lithium in the negative electrode, as well as other cell elements are protected (paragraph bridging columns 13 and 14).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Bates '765 by providing a current collector to the opposite side of the anode since it would have provided the requisite means to permit an electrical current to be drawn by an external circuit or load.

18. Claims 6, 7, 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bates '765 in view of U.S. Patent No. 6,485,622 (Fu).

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The teachings of Bates '765 have been discussed above and are incorporated herein.

In the event that the term about is deleted from claim 6 in attempt to define the range over the 102 rejection of Bates '765 above, it is held that the range would still be obvious for the reasons set forth herein.

The differences between Bates '765 and claims 6 and 7 are that Bates '765 does not teach of the second material having an ionic conductivity between  $10^{-5}$  S/cm and  $10^{-4}$  S/cm (claims 6 and 7) or of the second material being the ion-conducting glass ceramic as defined in claims 14 and 15.

Fu teaches that the same lithium ion conductive glass-ceramic material is known in the art for use in lithium electrochemical cells (abstract). These materials include ionic conductivities of  $10^{-4}$  S/cm (Table 2).

The composition has an increased ionic conductivity as well as enhanced thermal stability within electrochemical devices.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Bates '765 by selecting the second material to be the lithium ion conductive glass-ceramic material taught by Fu since it would have provided a material which provided both protection to the anode as well as increased the ionic conductivity of the protection composite in the cell. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*,

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325 U.S. 327, 65 USPQ 297 (1945) See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

19. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bates '765 in view of .

The teachings of Bates '765 have been discussed above and are incorporated herein.

The difference between Bates '765 and claim 17 is that Bates does not teach of providing a gradual transition between the first and second layers.

### ***Double Patenting***

20. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

21. Claims 1-12 and 14-16 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20, 25, 28 and

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30 of copending Application No. 10/686,189. Although the conflicting claims are not identical, they are not patentably distinct from each other.

Copending Application No. 10/686,189 claims an electrochemical device component, comprising: an active metal electrode having a first surface and a second surface; a protective composite on the first surface of the electrode, the composite comprising, a first material layer in contact with the electrode, the first material layer being ionically conductive and chemically compatible with the active metal; and a second material in contact with the first material, the second material being substantially impervious, ionically conductive and chemically compatible with the first material; wherein the ionic conductivity of the composite is at least  $10^{-7}$  S/cm (claim 1 as applied to instant claims 1 and 2). The elected species materials in both applications are identical in that the first material is the composite reaction product of lithium metal with  $\text{Cu}_3\text{N}$ , the second material is the ion conducting glass of claim 14 in the instant application and claim 28 of the copending application; and the active material is lithium.

The thickness ratio of the first material to the second material in the composite is less than 1-1000 (claims 8-11 as applied to instant claim 3).

The component further comprises a current collector on the second surface of the active metal electrode (claim 2 as applied to instant claim 4).

The ionic conductivity of the second material is between about  $10^{-6}$  S/cm and  $10^{-3}$  S/cm (claim 6 as applied to instant claims 5 and 6).

The ionic conductivity of the second material is between about  $10^5$  S/cm and  $10^{-4}$  S/cm (claims 6 and 7 as applied to instant claims 6 and 7).



The active metal of the electrode is lithium (claim 17 as applied to instant claim 8).

The first material is the composite reaction product of lithium metal with  $\text{Cu}_3\text{N}$  (claims 18 and 19 as applied to instant claims 9 and 10).

The second material is the same (claims 20-22 as applied to instant claims 11-12).

The second material is identical in scope (claim 28 as applied to instant claims 14 and 15).

The first and second materials are layers and thus being discrete (claim 1 as applied to instant claim 16).

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

22. Claims 1-17 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-17 of copending Application No. 10/731,771. Although the conflicting claims are not identical, they are not patentably distinct from each other.

Copending Application No. 10/731,771 claims an electrochemical device component, comprising: an active metal electrode having a first surface and a second surface; a protective composite on the first surface of the electrode, the composite comprising, a first material layer in contact with the electrode, the first material layer being ionically conductive and chemically compatible with the active metal; and a second material in contact with the first material, the second material being substantially

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impervious, ionically conductive and chemically compatible with the first material; wherein the ionic conductivity of the composite is at least  $10^{-7}$  S/cm (claims 1, 2, 23 and 24 as applied to instant claims 1 and 2).

The thickness ratio of the first material to the second material in the composite is less than 1-1000 (claim 7 as applied to instant claim 3).

The component further comprises a current collector on the second surface of the active metal electrode (claim 2 as applied to instant claim 4).

The ionic conductivity of the second material is between about  $10^{-6}$  S/cm and  $10^{-3}$  S/cm (claim 5 as applied to instant claim 5).

The ionic conductivity of the second material is between about  $10^5$  S/cm and  $10^{-4}$  S/cm (claim 6 as applied to instant claims 6 and 7).

The active metal of the electrode is lithium (claim 8 as applied to instant claim 8).

The first material is selected from the same Markush group (claims 9 and 10 as applied to instant claims 9 and 10).

The second material is identical in scope (claims 11-12 and 14 as applied to instant claims 11-12 and 14-15).

The first and second materials are layers and thus being discrete (claim 16 as applied to instant claim 16).

The first and second materials have a gradual transition (claim 17 as applied to instant claim 17).

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

***Allowable Subject Matter***

23. The elected species of the first material, composite reaction product of lithium metal with  $\text{Cu}_3\text{N}$  is neither taught nor reasonably suggested by the prior art of record. While Bates employs  $\text{Li}_3\text{N}$ , this layer is formed by reactive sputtering and not by a reaction product of lithium metal with  $\text{Cu}_3\text{N}$ . The reaction product of the instant claims appears to result in a composite  $\text{Li}_3\text{N}$ /copper metal first barrier material which is materially different from that of Bates. The beneficial effects of the protective  $\text{Cu}_3\text{N}$  film is seen in FIG. 7B; the impedance is dramatically lower in this case.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is 571-272-1283. The examiner can normally be reached on Monday to Thursday, 8:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

A handwritten signature in dark ink, appearing to read "Gregg Cantelmo", with a long horizontal stroke extending to the right.

gc

November 21, 2006

Gregg Cantelmo  
Primary Examiner  
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